



P-ISSN: 2394-1685
E-ISSN: 2394-1693
Impact Factor (ISRA): 5.38
IJPESH 2017; 4(3): 147-151
© 2017 IJPESH
www.kheljournal.com
Received: 28-03-2017
Accepted: 29-04-2017

Naseer Ahmad Bhat
PhD Research Scholar,
Department of Physical
education and Sports Science,
Annamalai University
Tamil Nadu, India

Dr. KV Balamurugan
Associate Professor, Department
of Physical Education and Sport
Science, Annamalai University,
Tamil Nadu, India

Correspondence
Naseer Ahmad Bhat
PhD Research Scholar,
Department of Physical
education and Sports Science,
Annamalai University
Tamil Nadu, India

International Journal of Physical Education, Sports and Health

Prevalence and pattern of injuries among varsity basketball players

Naseer Ahmad Bhat and Dr. KV Balamurugan

Abstract

Basketball is a most popular competitive sport, presenting a high incidence of contact and movement injuries and this consequently increases the risk of sports injury.

Objective: to determine the prevalence and pattern of injuries involved in varsity basketball players.

Methods: The study involving 84 varsity basketball players (38 boys and 36 girls; with age range 17 – 28 years). Injuries to players during 2014–2016 seasons were registered by using a questionnaire.

Results: A total of 68 injuries were recorded with an incidence of 80.95 injuries per 100 participants with the highest incidence being noted during competition same for boys and girls. Jumping/landing was the most common cause of injury (25%, N = 17), followed by collision (20.50%, N = 14). Most of the injuries were at the lower extremities (62%, N = 42); with majority at the knee joint (26%, N = 18) and ankle/foot (19%, N = 13). Ligament sprain was the most common types of injury (41%, N = 28). Most injuries (N = 49, 72.6%) occurred in the offensive half of the court and cryotherapy was the most frequently used management modality.

Conclusion: The overall incidence of injury among varsity basketball players was 80.95 injuries per 100 participants. The male gender exhibited a greater risk of injury than the female gender. Majority of the injuries were to the lower extremities and knee and ligament sprains were the most reported injuries. Exercise-based injury prevention programmes intended at improving strength and neuromuscular control may help to reduce the incidence of injuries.

Keywords: Basketball, prevalence, sports injuries

1. Introduction

Worldwide, individuals are progressively more participating in an expanding arena of vigorous physical activities as well as competitive sports at all levels. Basketball continues to enhance in popularity at all levels of play, from recreational to professional and remains immensely popular, not just in the United States, but throughout the world [1]. It has been recognized that specific injury pattern occur in different sports and at different levels [2, 3]. Basketball appears to have the highest incidence of injuries among limited contact sports. It is even referred to as being more hazardous, with a higher injury hazard, than contact sports. Consequently, the intensity and aggressiveness of the game should not be underestimated, because the modern game of basketball puts full emphasis on the speed and power of competitors. Strength and quickness are necessary to control an opponent's position, "muscle" a rebound, or "power" a shot, all of these are fundamentals for a successful basketball career. In recent years, more focus has been given to sport-related injuries, predominantly in lower extremities, which can be attributed to the types of movement, incidence of participation, and intensity of the sport. Sports injury is as any musculoskeletal destruction resulted from the contribution of the sport in either the practice or competition phases that compromised normal training in terms of form, duration, intensity or frequency. Specifically, more than 60% of all practice and game injuries were to the lower extremity including ankle, knee, and upper leg muscle injuries [4]. the majority of injuries occurred in the offensive zone of the court and collision was the most common causes of injuries [5]. In another study focused on several sports, basketball players among other athletes were reported to have the highest injury rate.⁶ In general incidence rate in basketball have been reported to be higher during competitive matches than training sessions [7, 8]. The study aimed at determining the prevalence and Pattern of Injuries among Varsity Basketball Players. Additionally, this study aims to describe high injury-prone injuries and game positions and which body segments are the most affected by them.

2. Methodology

The purpose of this study was to find the injury rate in varsity male basketball players in various competitions. Injuries for which male Basketball players sought attention during events from 2014-2016 were recorded. The total sample population consists of 84 basketball players (48 male and 36 female) from Annamalia University Tamil Nadu whose age ranges from 17 to 28 years. All the teams accepted to participate and verbal information was given to each team coach. The teams were introduced to the survey at the end of the seasons and the data were collected retrospectively. The inclusion criteria were players included in the regular team line-up (including substitutes). The questionnaire comprised 15 questions which included data relating to team affiliation and the players' gender, age, weight and height and six identical injury profile subsections, in which the players were asked to report all previous injuries. Players was also asked to report the number of years of basketball training, the number of training hours per week and his training routines. The data that were collected included whether the injury occurred during training or a competition, the skill performed, the injured player's court position and the anatomical localization of the injury. Questions concerning the ability for the player to complete the particular competition or training session, and whether the injury resulted in any absence from training and/or competition were also recorded. The data was collected through self administrated sports injuries questionnaire. A questionnaire was distributed in January 2017, together with written information and stamped self-addressed envelopes. The coach or a volunteer from each team was responsible for the distribution and the subsequent collection of the questionnaires and for ensuring that the questionnaires were returned by hand. We collected data from all players, including drop-outs because of an injury.

3. Result

There were 84 players comprising 48 boys (57.14%) and 36 girls (42.86%) aged 16.3 ± 0.9 years (range of 17 – 28 years). Among the 84 players, 32 players reported a total of 68 injuries (39 for male and 29 for female). The overall incidence of injury was 80.95 injuries per 100 participants for both genders.

We assessed the highest incidence of injuries suffered during competition [N = 51, 75% (32 for male and 19 for female)], whereas [N = 17, 25% (7 for male and 10 for female)] occurred during practice. (Table1).

Table 1: Injury sustained in Practice and Competition

Injury sustained	Boys n (%)	Girls n (%)	Total n (%)
Competition	32 (62.75)	19 (37.25)	51 (75)
Practice	7 (41.18)	10 (58.82)	17 (25)
Total	39	29	68 (100.0)

Majority of the injuries occurred in the offensive half [N = 49, 72.06% (28 male and 21 female)], while the defensive half accounted [N = 19, 28.94% (11 for male and 8 for female)] respectively. (Table 2)

Table 2: Zone of the court where injury occurred

Zone of the court	Boys n (%)	Girls n (%)	Total n (%)
Offensive Half	28 (57.14)	21 (42.84)	49 (72.06)
Defensive Half	11 (57.89)	8 (42.11)	19 (28.94)
Total	39	29	68 (100.0)

Anatomic site was defined as the location of pain or musculoskeletal discomfort marked by the human body (Figure 1). Regarding the anatomical site of injuries, mostly occurred lower limbs, accounting [N = 42, 62% (24 for male and 18 for female)] of injuries, followed by upper limbs and head/trunk, both accounting for [N = 26, 38% (15 male and 11 female)] of injuries.

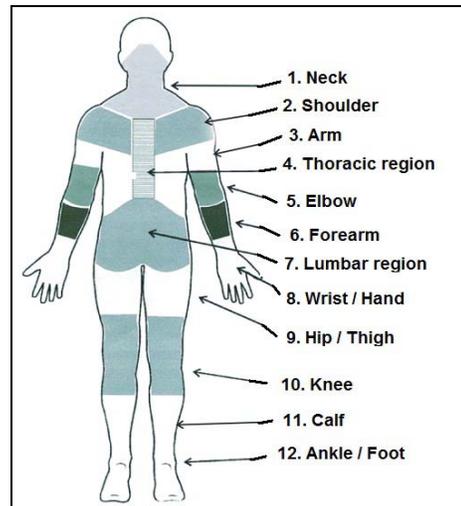


Fig 1: Anatomical site of musculoskeletal pain or anxiety marked.

Regarding injuries occurring to the specific anatomical site (Figure 1), the most frequently injured body part was the knee [N = 18, 26.47% (11 for male and 7 for female)] of injuries, followed by the foot/ankle [N = 13, 19.12% (8 for male and 5 for female)] and the fingers [N = 10, 14.70% (6 for male and 4 for female)]. After those, face [N = 6, 8.82% (3 for male and 3 for female)], elbow [N = 6, 8.82% (4 male and 2 female)], hip [N = 5, 7.35% (2 male and 3 female)] leg/thigh [N = 4, 5.88% (2 for male and 2 for female)], toes [N = 2, 2.94% (1 for male and 1 for female)], trunk [N = 2, 2.94% (1 for male and 1 for female)], shoulder [N = 1, 1.47% (1 for male)] and forearm-wrist [N = 1, 1.47% (1 for male)] occupied the last positions. (Table3).

Table 3: Body parts injured.

Body part injured	Boys n (%)	Girls n (%)	Total n (%)
Head/Face	3 (50.0)	3 (50.0)	6 (8.82)
Trunk	1 (50.0)	1 (50.0)	2 (2.94)
Forearm	1 (100.0)	- (0.0)	1 (1.47)
Shoulder	- (0.0)	1 (100.0)	1 (1.47)
Hand/Finger	6 (60.0)	4 (40.0)	10 (14.70)
Elbow	4 (60.0)	2 (40.0)	6 (8.82)
Hip	2 (40.0)	3 (60.0)	5 (7.35)
Leg/Thigh	2 (50.0)	2 (50.0)	4 (5.88)
Knee	11 (61.11)	7 (38.89)	18 (26.47)
Ankle	8 (61.54)	5 (38.46)	13 (19.12)
Toes	1 (50.0)	1 (50.0)	2 (2.94)
Total	39	29	68 (100.0)

Regarding the causes of injuries, Jumping/landing was found to be the most common cause of injury, accounting [N = 17, 25% (10 for male and 7 for female)], while the collision [N = 14, 20.59% (8 for male and 6 for female)], previous injury [N = 13, 19.12% (10 for male and 7 for female)], sudden turn and twist [N = 10, 14.71% (6 for male and 4 for female)] and hit by a projectile ball was the least cause of injury [N = 6, 8.82% (4 for male and 2 for female)] and other [N = 8, 11.76% (3 for male and 5 for female)]. (Table4).

Table 4: Causes of injuries

Cause of injury	Boys n (%)	Girls n (%)	Total n (%)
Collision	8 (57.14)	6 (42.86)	14 (20.50)
Jumping/landing	10 (58.88)	7 (41.18)	17 (25)
Hit by a projectile ball	4 (66.67)	2 (33.33)	6 (8.82)
Sudden turn/twist	6 (60.0)	4 (40.0)	10 (14.71)
Previous injury	8 (61.67)	5 (38.46)	13 (19.12)
Others	3 (37.50)	5 (62.50)	8 (11.76)
Total	39	29	68 (100.0)

Regarding injury diagnostic, we found that Sprain was the most common type of injury accounting [N = 28, 41.18% (16 for male and 12 for female)] of all injuries, while the contusion [N = 9, 13.24% (6 for male and 3 for female)], muscle injury [N = 8, 11.76% (5 for male and 3 for female)], cramp and strain [N = 7, 10.29% (3 for male and 4 for female)], wound/laceration [N = 6, 8.82% (4 for male and 2 for female)] and fracture/dislocation was the lowest type of injury [N = 3, 4.41% (2 for male and 1 for female)]. (Table5).

Table 5: Types of injuries sustained

Injury	Boys n (%)	Girls n (%)	Total n (%)
Contusion	6 (66.7)	3 (33.3)	9 (13.24)
Wound/Laceration	4 (66.7)	2 (33.3)	6 (8.82)
Strain	3 (42.86)	4 (57.14)	7 (10.29)
Sprain	16 (57.14)	12 (42.86)	28 (41.18)
Muscle Injury	5 (62.5)	3 (37.5)	8 (11.76)
Fracture/Dislocation	2 (66.7)	1 (33.3)	3 (4.41)
Cramp	3 (42.86)	4 (57.14)	7 (10.29)
Total	39	29	68 (100.0)

Regarding first aid, The most frequently used treatment modalities were cryotherapy [N = 31, 45.59% (18 male and 13 female)], followed by medicine was [N = 16, 23.53% (9 male and 7 female)], rest was [N = 13, 19.12% (7 male and 6 female)], massage was [N = 7, 10.29% (4 male and 3 female)] and the most least is surgery was [N = 1, 1.47% (1 male)]. (Table6).

Table 6: First aid rendered to the injured players

Modalities	Boys n (%)	Girls n (%)	Total n (%)
Medicine	9 (56.25)	7 (43.75)	16 (29.94)
Massage	4 (57.14)	3 (42.86)	7 (10.29)
Cryotherapy	18 (58.06)	13 (45.94)	31 (45.59)
Surgery	1 (100.0)	- (00.0)	1 (1.47)
Rest	7 (53.85)	6 (52.15)	13 (19.12)
Total	39	19	68 (100.0)

Regarding further care disposition, 76% of the total injured players continued playing after receiving medical attention while 24% could not continue playing despite being treated.

4. Discussion

In basketball as ball handling is inevitable and where passing, shooting, receiving, and rebounding are most important. Basketball is the second fastest game in the world. It involves rigorous movements of upper and lower body leaving the athlete vulnerable to various injuries. The twisting, turning, jumping and landing movements leads to strain of lower leg and lower back immensely.

In the present study, the risk of injury was greater among males than females.

In both male and female gender, there was a predominance of injuries during competition rather than during practice. In contrast, Messina *et al.* and Agel *et al.* report that competition is the time in which more injuries occur [9, 10].

In our study, this was confirmed, where limbs accounted for 62% of all injuries. Concerning grouped body region, a large portion of literature addressing basketball report lower limbs as the region with the highest incidence of injuries [11-13].

The knee was the anatomic site with the greatest frequency accounted for 26.47% of total injuries. Other authors report knee as the most commonly affected region [14-16]. During the maximal ground reaction force, the structures of the knee are fully tensed by the impact load, which favors the occurrence of injury [17]. There are still some controversies on the most frequently injured anatomical site in basketball. While some authors reported the knee as most commonly injured body part [16, 18], most other authors reported the ankle to be the most commonly injured body site [8, 19]. Repetitive jumping in basketball imposes recurring consistent vertical ground reaction forces of up to four times body weight on the weight-bearing knee joint [20]. There is evidence that flexion of the knee during the landing phase can reduce the odds of injury due to lower ground reaction forces and lesser absorption of impact [21]. Thus, the high correlation between the flexion angle of the knee and ground reaction force may be an important factor to reduce the impact of landing after a jump and a consequent lesser possibility of injury [21]. Another explanation for knee injuries may be related to muscle fatigue, which impairs performance and alters proprioceptive function. Thus, fatigue may reduce the pre activation of stabilizing muscles of the knee, causing a loss of balance and leading to excessive strain on the structures of the joint, particularly the ligaments, thereby favoring the occurrence of injury [17, 22, 21].

This study exposed that jumping/landing and collision was the most common causes of injuries in both male and female basketball players. This is in agreement with other studies on adolescent/youth basketball players [12, 19]. However, it contrasts with some other studies on professional male and female basketball players in which collision with an obstacle (fellow player or opponent) was documented as the major cause of injuries [5, 18]. This contrast may be due to the difference in the levels of play and skills. Regarding the mechanism, injuries caused by direct contact were the most frequent in both sexes. These data corroborate findings described by Kofotolis and Kellis [23], who report direct contact to be the main mechanism of injury stemming mainly from the constant movements of the sport, such as collisions with the floor, backboard supports, teammates and opponents. According to Agel *et al.*, [10] the high degree of physical contact between opponents, together with the lack of technique for practicing the sport on the part of young players, predispose individuals to musculoskeletal injuries.

The foot/ankle was the second most affected anatomic site, According to Gomez *et al.*, 31% of injuries to the ankle complex affect basketball players between 14 and 18 years of age [24]. The occurrence of this type of injury may be explained by the impact with the floor of the basketball court, especially during jumping and landing on the side of the foot or on someone else's foot [25, 26].

Ligament Sprain was predominantly the most common type of injury documented for both genders which was more represented at the knee and ankle joints. This is consistent with other previous epidemiological studies on adolescent and professional basketball players [5, 12, 15]. Jumping/landing caused majority of the knee and ankle ligament sprains documented in this study. Intervention programs that focus on jumping or balance training in these players could prove to be effective injury prevention strategy [27, 28].

The present study exposed that the offensive zone recorded the highest injuries than the defensive half. This agrees with other previous studies [5, 8, 19]. A high incidence of injuries in this zone is probably because it is a very active area where offensive players try to make shots against their opponents followed by the key area where they struggle to get rebounds in order to make a shot or save the ball from getting into their opponent possession.

The most commonly used management modalities were cryotherapy. Cryotherapy in the form of cold compress or cold spray application remains the mainstay first aid management for most acute on-field injuries. Over 50% of treatments given during the competition involved Cryotherapy. This corroborates other studies [5, 6, 29, 30]. This is because many of the injuries were minor ligament sprains and muscle strains which did not require any form of special treatment modalities. This implies that 1 out of every 4 injuries resulted in a disposition of discontinuity of play during the competition. These time loss injuries were moderate and severe injuries that prevented players from returning to play immediately after a sideline management.

5. Conclusion

I wish to cite the following statements, "Injuries are the ornaments of sports" and "Prevention is better than the cure". One cannot evade the injuries but the success lies in minimizing these injuries. As Troy Vincent said, "Injuries are part of the game, but sometimes we can avoid them by just practicing our techniques". A total of 84 players 38.10% were affected by some kind of injury during the study. The findings of the present study revealed that the male gender (57.35%) was at greater risk of injury than the female gender (42.65%). Majority of the injuries was lower extremities and the knee and ankle/foot were the most affected anatomic sites, independent of gender and the characteristics analyzed. The incidence of injury was higher in competition than in practice sessions. The most common injuries were ligament sprains and the repeated injury diagnosis was the knee and ankle sprain. Jumping/landing and collision was the key mechanism of injury. Most injuries were regarded as mild and knee region presented the highest level of morbidity. Exercise-based injury prevention programmes aimed at improving strength and neuromuscular control may help to reduce the incidence of injuries.

6. References

- Cantwell JD. The physician who invented basketball. *Am J Cardiology*. 2004; 93:1075-1077.
- Bahr R, Krosshaugh T. Understanding injury mechanisms: a key component of presenting injuries in sport. *British J Sport Med*. 2005; 14:286-290.
- Bruce CY: Injury and disability in matched men's and women's intercollegiate sports. *Am J Public Health*. 1991; 80:410-504.
- Agel J, Olson DE, Dick R, Arendt EA, Marshall SW, Sikka RS. Descriptive epidemiology of collegiate women's basketball injuries: National Collegiate Athletic Association Injury Surveillance System, 1988-1989 through 2003- 2004. *Journal of Athletic Training*. 2007; 42(2):202-10.
- Akinbo S, Odebiyi D, Adebayo A. Pattern of musculoskeletal injuries in professional basketball league in Nigeria. *The internet Journal of Rheumatology*. 2008; 5(1):87-88.
- Owoeye OBA. Pattern and management of sports injuries presented by Lagos state athletes at the 16th National Sports Festival (KADA games 2009) in Nigeria. *Sports Med, Arthro, Rehab, Therapy Tech*. 2010; 2:3.
- Zvijac K, Thompson W. Epidemiology of sport injuries. *Am J Sports Med*. 1996, 53:86-97.
- Harmer PA. Basketball injuries. *Med Sports Sci* 2005; 49:31-61.
- Messina DF, Farney WC, DeLee JC. The incidence of injury in Texas high school basketball. A prospective study among male and female athletes. *Am J Sports Med*. 1999; 27:294-299.
- Agel J, Olson DE, Dick R, Arendt EA, Marshall SW *et al*. Descriptive epidemiology of collegiate women's basketball injuries: National Collegiate Athletic Association Injury Surveillance System, 1988-1989 through 2003- 2004. *J Athl Train*. 2007; 42:202-210.
- Cheng TL, Fields CB, Brenner RA, Wright JL, Lomax T, Scheidt PC. Sports injuries: an important cases of morbidity in urban youth. *Pediatrics*. 2000; 105:E32.
- Messina DF, Farney WC, DeLee JC. The Incidence of Injury in Texas High School Basketball. A prospective study among male and female athletes. *Am J Sports Med*. 1999; 27:294-296.
- Prebble TB, Chyou PH, Wittman L, Mccornick J, Collins K, Zoch T. basketball injuries in a rural area. *Wm J*. 1999; 98:22-4.
- Dehaven KE, Lintner DM. Athletic injuries: comparison by age, sport and gender. *Am J sports Med*. 1986; 14:218-24.
- Carazzato JG, Campos LAN, Carazzato SG. Incidencia de lesões traumáticas em atletas competitivos de dez tipos de modalidades esportivas. *Rev Bras Ortop*. 1992; 27:745-58.
- Hickey GJ, Fricker PA, McDonald WA. Injuries in young elite female basketball players over a six-year period. *Clin J Sport Med* 1997; 7:252-256.
- McCarthy MM, Voos JE, Nguyen JT, Callahan L, Hannafin JA. Injury profile in elite female basketball athletes at the Women's National Basketball Association combine. *Am J Sports Med* 2013; 41:645-651.
- Da Silva AS, Abdalla RJ, Fisberg M. Incidence of musculoskeletal injuries in elite female basketball athletes. *Acta Ortop Bras*. 2007, 15(1):43-46.
- Borowski LA, Yard EE, Fields SK, Comstock RD. The Epidemiology of US high school: basketball injuries, 2005–2007. *Am J Sports Med*. 2008, 36:23-28.
- Silvers HJ, Giza ER, Mandelbaum BR. Anterior cruciate ligament tear prevention in the female athlete. *Curr Sports Med Rep*. 2005, 4:341-343.
- Louw Q, Grimmer K, Vaughan C. Knee movement patterns of injured and uninjured adolescent basketball players when landing from a jump: a casecontrol study. *BMC Musculoskelet Disord*. 2006; 7:22.
- Belechri M, Petridou E, Kedikoglou S, Trichopoulos D. Sports Injuries European Union Group Sports injuries among children in six European union countries. *Eur J Epidemiol*. 2001; 17:1005-1012.
- Kofotolis N, Kellis E. Ankle sprain injuries: a 2-year prospective cohort study in female Greek professional basketball players. *J Athl Train*. 2007; 42:388-394.
- Gomez E, DeLee JC, Farney WC. Incidence of injury in Texas girls' high school basketball. *Am J Sports Med*. 1996; 24:684-687.
- Hosea TM, Carey CC, Harrer MF. The gender issue: epidemiology of ankle injuries in athletes who participate

- in basketball. *Clin Orthop Relat Res.* 2000, 45-49.
26. Vanderlei FM, Bastos FN, de Lemes IR, Vanderlei LC, Júnior JN *et al.* Sports injuries among adolescent basketball players according to position on the court. *Int Arch Med.* 2013; 6:5.
 27. Emery CA, Rose MS, McAllister JR, Meeuwisse WH. A prevention strategy to reduce the incidence of injury in high school basketball: a cluster randomized controlled trial. *Clin J Sport Med.* 2007; 17(1):17-24.
 28. McGuine TA, Keene JS. The effect of a balance training program on the risk of ankle sprains in high school athletes. *Am J Sports Med.* 2006; 34(7):1103-1111.
 29. Awotidebe TO, Onigbinde AT, Mbada CE, Oje OO. Pattern of sport injuries at the 15th Nigeria national sports festival. *Medicinal Sportiva.* 2009; 20:1197-1203.
 30. Jelsma J, Dawson H, Smith G, Satumba C, Madzivire D. Provision of physiotherapy services at the sixth all Africa games. *Br J Sports Med.* 1997; 31:246-248.